BENCHMARKS

THE COMPUTING CENTER

University of North Texas

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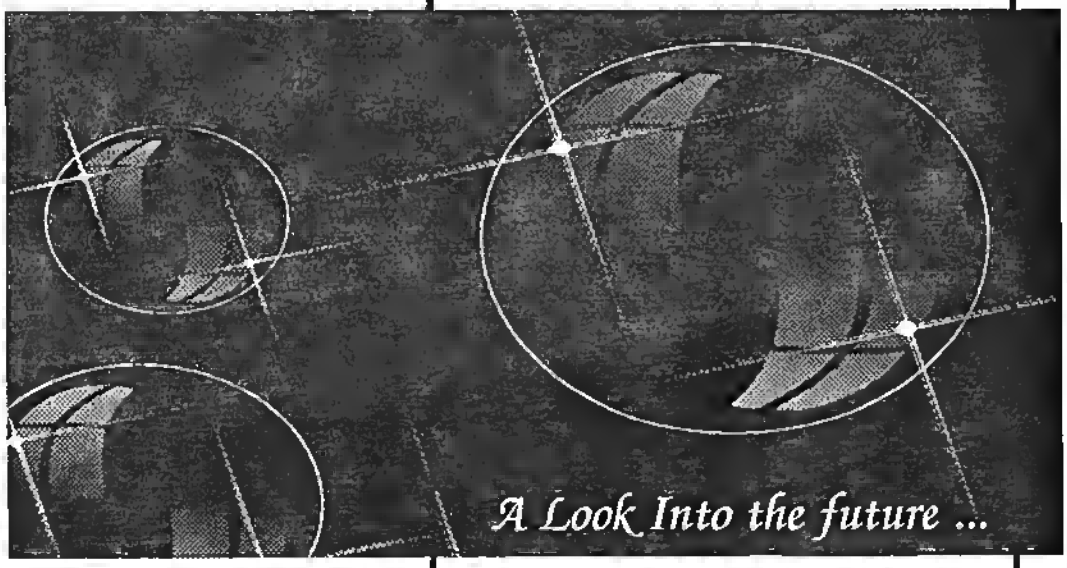
MARCH 1990

Computing in the 90's



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There's a Workstation in Your Future (page 6)

VAX/VMS Computing in the 1990s (page 23)

SERVICES AVAILABLE TO USERS OF THE UNT COMPUTING FACILITIES

The UNT Computing Center is located in the Information Sciences Building (ISB), Room 119. Phone Numbers:

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Micro Support:	(817) 565-2316, 565-2319
Graphics Lab:	(817) 565-3479
ISB I/O Area:	(817) 565-3890
BA I/O Area:	(817) 565-2350

All personnel listed below can be contacted either by calling the Computing Center or by sending them electronic mail on MUSIC/SP (ID-codes follow each name. All IDs are on BITNET node UNTMUSIC).

Benchmarks - Claudia Lynch (AS04)

Information & ID-Codes; Disk Space Problems - Theresa Russell

Statistical/Research Support - George Morrow (AS01), Panu Sittiwong (AC09), Phanit Laosiririat (AC44)

Academic ADABAS/COM-PLETE - Steff

CRSP & COMPUSTAT Problems - Panu Sittiwong (AC09), Phanit Laosiririat (AC44)

Student Programming Problems - CSCI Dept., GAB Room 550; BCIS Dept., BA Room 152

Problems with JCL, Passwords, or Operating Systems; or Communication/Terminal Problems - Help Desk

Data Entry; Test Scoring & Analysis - Betty Grise

Administrative Applications - Coy Hoggard

Printout Retrieval - ISB or BA I/O Operators

DIALING-UP UNT COMPUTERS OVER THE TELEPHONE

Phone numbers for the Local Area Network (LAN) are:

300 - 2400 BAUD:	(817) 565-3300
300/1200 BAUD	(817) 565-3499
300 - 9600 BAUD:	(817) 565-3461
300 - 9600 BAUD:	D/FW METRO 429-6006, 429-9314

Area code 214 must dial 817 before the METRO #.

The numbers that accomodate multiple baud rates have an autobaud feature that requires you to hit the <RETURN> key repeatedly so that the receiving modem can determine the appropriate baud rate. When you have established a communications link, the # prompt will appear on your screen and you can enter one of following CALL commands to connect with the computer of your choice.

CALL 8040 connects with the NAS/8083 (supports line editing or PCWS). Operating environments available are: MUSIC/SP, VM/CMS.

CALL 3270 connects with the NAS/8083 through a 3270 protocol converter (supports full-screen editing). Operating environments are: MUSIC/SP, VM/CMS, ADABAS/COM-PLETE, PHOENIX

CALL DEC connects with the VAXcluster (VMS, Eunice)

CALL 780 connects with the Research VAX (Unix)

CALL 3000 connects with the Libraries' HP-3000 (Bibliographic database).

CALL 6800 connects with the NBI (Unix)

Communications Settings

LAN addresses	Data Bits	Parity	Stop Bits
DEC, 3000	8	N	1
8040, 3270, 780, 6800	7	E	1

HOURS FOR UNIVERSITY OF NORTH TEXAS COMPUTER ACCESS AREAS : SPRING 1990*

Location	Days	Times
Computing Center RJE	Sunday Monday Tuesday-Saturday	Noon-Midnight 7 a.m.-Midnight 7 a.m., Tues.-Midnight Sat. (Open 24 hours/day)
ISB 110 Terminal Area	Sunday Monday-Thursday Friday Saturday	1p.m.-Midnight 8:00 a.m.-Midnight 8:00 a.m.-9 p.m. 9 a.m.-9 p.m.
College of Business	Sunday Monday-Thursday Friday, Saturday	Noon-11:45 p.m. 8:15 a.m.-11:45 p.m. 8:15 a.m.-7:45 p.m.
GAB 550C	Sunday Monday-Thursday Friday Saturday	4 p.m.-Midnight 8 a.m-Midnight 8 a.m.-5 p.m. 2 p.m.-8 p.m.
Graphics Lab	Sunday Monday-Thursday Friday Saturday	Noon-10 p.m. 8 a.m.-11 p.m. 8 a.m.-6 p.m. Noon-5 p.m.
Willis Library	Sunday Monday-Thursday Friday Saturday	1 p.m.-Midnight 7:30 a.m.-Midnight 7:30 a.m.-9 p.m. 9 a.m.-9 p.m.

*Hours may vary. Check MUSIC/VAX News and/or posted schedules for exceptions.

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GENERAL INFORMATION

Academic Computing in the 1990s: A Network of Scholars

By Dave Molta, Director of Academic Computing (BITNET: MOLTA@UNTVAX)

The theme for this issue of *Benchmarks*, "Computing in the 1990s," offers me the opportunity to publicly state my perspectives on what changes we are likely to see during the 1990s with respect to academic computing. Keep in mind that when I refer to academic computing, I am doing so in a generic sense; while many of the developments that I foresee may come to fruition at UNT, this article does not represent an action plan endorsed by the Computing Center, Computing Council, or any other policy-making entity. Rather, it is an attempt to stimulate some discussion concerning where the university should be going based on my assessment of both general technology trends and academic computing trends at other major universities. All too often, our immediate need to solve specific problems, the so-called fire fighting mode, makes it difficult to reflect on an overall vision of what benefits we expect from technology. This article represents my attempt toward this end, and I welcome feedback from the university community, for as is the case with any complex challenge facing us, the quality of the end product is generally enhanced by a diversity of input.

After reading this article, many of you will be quick to ask a fundamental question; how much does it cost? To this question, I must honestly answer that while I cannot offer a concrete figure in terms of dollars and cents, I can with some confidence predict that it will cost more than we think we can afford. From faculty and staff salaries to laboratory equipment to building infrastructure, the problem of shortages in funding for public education in Texas are somewhat overwhelming. However, it should be clear to even the most computer-phobic amongst us that without a sound base of technological infrastructure, the University of North Texas will find it increasingly difficult to compete for the economic rewards that accrue to institutions that achieve a reputation for excellence. Just as the Japanese have enhanced their standard of living through a combination of hard work and application of technology, we can enhance our position in the same way. More specifically, the wise application of technology will enhance the productivity of existing faculty and students while at the same time greatly enhancing our ability to attract superior teachers, researchers, and students, the heart and blood of any academic institution.

Computer Technology in the 1990s: A Forecast

It is truly a humbling experience to devote yourself to a discipline and be asked to predict the future, only to realize that a single unknown future event can turn your well reasoned judgement into naive speculation. With respect to computing in the 1980s, one could suggest that the introduction of the IBM Personal Computer in 1981 was just such an event. Yes, there were microcomputers prior

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to IBM's introduction, but the IBM PC legitimized the market and led to perhaps the most fundamental change in the way people manage information since the invention of the printing press. What was a hobbyist's diversion at the start of the decade was a tool that virtually no businessman or scholar could do without by the end of the decade.

Fortunately for the prognosticator of computing in the 1990s, the trends are a bit more obvious. While the 1980s can be regarded as the decade of personal computing, the 1990s are likely to be characterized as the decade of inter-personal computing. By this, I mean that the potentially awesome power of computing machines will be limited only by their inability to access information. Thus, to paraphrase the words of a major computer manufacturer, the network will be the computer. Lacking connectivity with other computers and databases, the isolated computer will be seriously impaired in its ability to enhance scholarly productivity. When provided with high-speed access to vast repositories of data, the nature of the scholarly enterprise will undoubtedly undergo a metamorphosis.

Even a cursory examination of the trade press or scholarly journals in the computer arena demonstrate that connectivity is the number one issue facing information systems professionals as we begin the 1990s. Fortunately, the major technological developments of the 1980s, including advancements in microprocessor power, large-scale integration, and fiber-optic communications, are precisely the building blocks needed to construct sophisticated and accessible information networks in the 1990s. Lest one doubt the potential impact of modern communications technology, take a look at recent political developments in Eastern Europe. Many analysts have concluded that advancements in communications were a powerful stimulus leading to change. With respect to the national research community, the dependency on networking, as evidenced by exponential increases in traffic on the National Science Foundation's NSFnet, has led to profound changes in how research is conducted and communicated.

The Vision: A Scholar's Workstation

The concept of a scholar's workstation has received a significant amount of attention within the academic computing community in recent years. Consistent with the overall objective of an educational institution, the scholar's workstation is a tool that increases a person's ability to gather, analyze, and communicate information. The workstation itself might be a PC, a Macintosh, or a high-performance UNIX workstation, but a single connection, usually an Ethernet network cable of some sort, provides the scholar with a window to the world. Using that connection, scholars can have access to information and computational resources within their department, across campus, within the region/state, or across the world. Each of these is addressed below.

Departmental resources might consist of software applications, computer peripherals, and information databases. Software applications can be made more accessible to departmental users by installation on a central file server. Not only can the variety of applications be made more diverse, but ease of access can be improved and overall costs can be reduced through a networked applications delivery strategy. Computer peripherals, including laser printers, plotters, tape-backup units, CD-ROMs, and other devices that can not be economically justified for each computer user, can be made available to all departmental users on a network. To take just one example, currently available discipline-specific CD-ROMs that store full-text and/or abstracts to hundreds of journals on a single disk could be made available to every member of the department. Departmental information databases, which could include electronic mail, administrative files, test databases, raw research data, minutes of meetings, committee reports, and a variety of other information that is useful primarily to members of that specific department can be made immediately accessible to departmental personnel. A well implemented network gives a department a competitive edge that increases productivity while also serving as a possible recruiting tool for new faculty and students.

While the 1980s can be regarded as the decade of personal computing, the 1990s are likely to be characterized as the decade of inter-personal computing.

Campus resources include special-purpose computer resources, such as mini- and mainframe computer systems, institutional databases, instructional laboratories, and campus-wide electronic mail. Providing access to central computer systems via network gateways is perhaps the most compelling economic incentive for installing a departmental network. The per-port cost of connecting to the academic or administrative mainframe systems can be reduced from $500 to $1000 in a stand-alone environment to as little as $50 in a networked environment. Once these gateways are installed, authorized users can gain access to a wealth of institutional information ranging from the library card catalog to mainframe databases to the Student Information Management System. Not only are these central systems more economically accessible, but the ability to transfer information between personal and institutional computer systems is greatly enhanced. With the implementation of general-access networked microcomputer labs, instructors will also be capable of enhancing the educational process by making special-purpose software available to students while at the same time facilitating student-teacher communication through electronic mail and information distribution. Finally, the potential productivity gains that can be realized through a campus-wide electronic mail system oriented around personal rather than mainframe computers will become feasible. While host-based electronic mail systems are effective for exchanging messages, the real power of a campus mail system lies in its ability to facilitate the exchange of machine-readable data, including programs, documents, spreadsheets, and databases. Since most of these data reside on personal workstations, the mail system itself should also be workstation-based if we are to expect people to use it to its fullest extent.

The final element of the scholar's workstation involves the provision of connectivity to off-campus resources over wide-area network connections. These connections allow scholars to gain access to a wealth of resources across the National Science Foundation's NSFnet, as well as regional and international networks such as THEnet and BITNET. A scholar with access to NSFnet is able to query the contents of library catalogs at other universities, send electronic mail or transfer files to colleagues at other institutions, participate in national computer-based conferences on a wide variety of scholarly topics, and access specialized computer facilities, such as the NSF supercomputer facilities, from his/her desktop. These wide-area networks represent a national infrastructural investment similar in many ways to the interstate highway system. Just as an individual without access to transportation is isolated and constrained in many ways, so too will the scholar of the 1990s be constrained if they do not have access to national computer networks.

The scholar's workstation combines all of the benefits of personal computing with the economies of scale attributable to data and special-purpose device sharing. The non-technical scholar whose needs consist primarily of word processing and electronic mail is provided with simple access to these services without having to deal with issues such as software installation, printer configuration, and mainframe editors. The scholar whose work depends on mainframe computing systems, on the other hand, is provided with the capability to quickly transfer data between personal and host systems, thus permitting the most appropriate processor to perform the computing task at hand. The scientific researcher who needs to exchange data sets with colleagues across the country and perform analyses using supercomputers is provided with those capabilities from the desktop. Finally, all scholars' desiring to integrate computer applications into the educational process benefit from the ability to make applications available to students in a microcomputer laboratory environment while preserving the ability to interact with students electronically.

The scholar's workstation combines all of the benefits of personal computing with the economies of scale attributable to data and special-purpose device sharing.

The Scholar's Workstation at UNT: Where do we Stand?

Having outlined a vision for what is possible, I feel some responsibility to report on where we currently stand with respect to the implementation of such a system at UNT. At the risk of being labeled a fence straddler, I must honestly state that there is good news and bad news to report. On the favorable side, we have a campus networking infrastructure that is in many respects the most sophisticated of any educational institution in the state. Our campus broadband system, for example, is the largest such university system in the state with respect to the total number of ports. Our campus microcomputer network, which currently consists of over 40 file servers interconnecting nearly 1000 computers, offers services comparable to the most sophisticated university systems in the country. In terms of access to national research networks, we recently upgraded the speed of our communications link into NSFnet by a factor of fifteen to its current 128 kilobits per second, and there is talk

of future upgrades to 1.5 megabits per second or more. That's the good news.

On the negative side, there is a great deal more to report, but there is some comfort in knowing that our problems are shared by colleagues at many of the nations most prestigious institutions of higher education. While many academic departments have installed high-speed networks in recent years, most lack the financial resources to embark on this adventure. We will all need to work together to insure that the computing have-nots are not isolated from the computing haves simply because external funding is not available to support their academic computing needs. Our broadband network system, which was installed in 1983, is well beyond its initial projected five-year life span. In order to achieve the high-speed data requirements needed for the distributed database, scientific visualization, and multimedia instructional applications of the 1990s, we will need to implement a campus-wide fiber-optic communications network. Work on this has begun, but it will require a multi-year financial commitment before it is extended to all major buildings on campus. Finally, the number of departmental and centralized support personnel needed to manage such a complex academic computing environment have simply not kept pace with demand, thus leading to high levels of frustration among many computer users on campus. Securing adequate funding for the hiring of capable computer professionals, particularly in a technology-oriented metropolitan area where demand for quality technical people is high, is a challenge that we must confront head-on as the university enters its second century.

During the past several years, I have had the opportunity to become an active participant in the development of academic networking at the campus, regional, and national levels. My exposure to the benefits accruing to those institutions that make effective use of networking technologies has led to an evangelistic advocacy for institutional investment in this area. I sincerely believe that the emergence of UNT as a nationally prominent education and research institution can be greatly enhanced by a wise investment in computer networking technologies. By aggressively deploying these technologies, we will greatly enhance our ability to attract highly qualified faculty, students, and staff, the most precious resources available to institutions of higher education, while at the same time enabling our existing people to be productive to their fullest potential. I welcome your feedback on this important topic.§

There's a Workstation in Your Future

By Claudia Lynch, *Benchmarks* Editor
(BITNET: AS04@UNTVM1)

When we decided that "Computing in the '90s" was going to be the focus of our March issue, I began to survey the trade literature to see what the "experts" had to say.

The concensus seems to be that the 1990s promise to be a decade of connectivity. A decade inhabited by a plethora of workstations, connected to a myriad of resources through Local and Wide Area Networks, as our feature article, "Academic Computing in the 1990s: A Network of Scholars," describes. In fact, according to Martin Heller, "the very word *workstation* denotes connectivity." (p. 63) Interestingly enough, all this connectivity could bring mainframe computing back into the forefront, this time in a role of centralized storage facilities.

IBM and SAA

In the IBM enviroment, for example, Systems Application Architecture (SAA), introduced in 1988, and OfficeVision, a collection of software for SAA, announced in 1989, set the stage for computing in the 1990's. SAA is a whole family of user interfaces that "include everything from ground-level character-only systems up to high-powered graphical workstations, and they span machines from PCs up to mainframes running IBM's MVS and VM operating system." As its name implies, SAA is a complete system architecture, including standards for networking and database queries. The networking standard is called Systems Network Architecture (SNA), and the database query standard is called the Structured Query Language (SQL).

UNT Gets a New VAX

By Billy Barron, VAX System Manager, (BITNET:BILLY@UNTVAX)

On March 1st, a new VAX 6310 was installed. At the same time, one of the old VAXes was deinstalled. The other 785 will remain in production till the end of the spring semester. It will be deinstalled around May 12th.

The VAX 6310 is rated at 3.8 VUPS. 1 VUP (VAX Unit of Processing) is equalivent to the processing power of a VAX 780. Each of the old VAX 785s is capable of 1.6 VUPS. In addition, it is possible to house a 36 VUP VAX 6460 within the VAX 6000 cabinet. The new machine has 64 MB of main memory (each 785 had 32 MB). The 6310 has two 10 MB/sec BI Channels for I/O. The internal system bus known as the XMI bus has a bandwidth of 100 MB/sec. The VAX 6310 has a TK70 tape drive so we can now read/write TK70 tapes and read TK50 tapes. Other nice features include smaller footprint and less air conditioning and power requirements.§

The 1990s promise to be a decade of connectivity.

As Wayne Rash Jr. states in his article "IBM's Vision for Your Office," the introduction of SAA and Office Vision tells us several things about IBM's plans for the future.

> First IBM is committed to the infusion of personal computers throughout its corporate base. Personal computers (IBM would prefer you to use PS/2s) are an integral part of OfficeVision. The indication is that future applications will require personal computers to reduce the load on the mainframe processor.
>
> Second, IBM believes that the LAN is here to stay. LANs provide the bulk of the communications required by SAA, and the first version of OfficeVision will be a LAN product. In the future, LANs will be even more necessary to SAA than they are now.
>
> Finally, IBM still has its eye on the continuation of the mainframe as the backbone of corporate computing. Ultimately, SAA depends on data residing on a mainframe. This means that IBM plans to have data managed by a data-processing department. (p. 151)

According to Rash, this is a distinct improvement over the way many of today's corporations handle their data. "Management decisions are being made with data that may be corrupted or outdated, and data vital to the operation of the corporation may be lost through something as minor as the failure of a $200 hard disk drive." (p. 152) The coupling of LANs with SQL would allow users to access a mainframe database with the same ease they access data on their personal computers, and these are all IBM proprietary products (presuming the LAN is an IBM Token Ring). What a deal—companies depend more and more on central mainframes while at the same time buying more and more personal computers, and all from IBM!

Fortunately for those who are loathe to buy from big blue, SQL servers are available from Oracle, Ashton-Tate, Gupta Technologies, and Word Tech. As Rash puts it, "as the benefits of SAA become clear, there will be a way to achieve them outside of IBM." (p. 152) In fact, the ability to do SAA without moving to IBM as a sole supplier makes it much more likely to happen in the near future. LAN-based database servers can handle the same operations as a mainframe DBMS, permitting control of the database to remain within an individual department, and new advances in data archiving will give the servers many mainframe-like attributes in terms of security and backup capabilities.

GUIs

Graphical User Interfaces (GUIs) are an essential part of all workstations. According to Martin Heller (p. 64):

> GUIs are necessary features on a workstation for many reasons. To begin with, they look good. Don't discount visual appeal—it makes a big difference in your attitude if you're looking at something attractive. In addition, GUIs are easy to learn and easy to use. Then throw into the GUI's feature/benefit statement the advantage of interoperability among different computers and operating systems, and you have some rather compelling reasons for mice and windows. Once you have learned to use Microsoft Windows, for instance, you'll find that you already know how to use OSF/Motif and OS/2 PM

According to Henry and Baran, if you are confused about GUIs, look at a Macintosh. As they say, "the MAC defined the parts we've come to associate with a GUI:

- a pointing device, typically a mouse
- on-screen menus that can appear or disappear under pointing-device control
- windows that graphically display what the computer is doing
- icons that represent files, directories, and so on
- dialog boxes, buttons, sliders, check boxes, and a plethora of other graphical widgits that let you tell the computer what to do and how to do it." (p. 250)

GUIs do not have to have all of these features, but they usually have most of them. More importantly, they usually have three major components: a windowing system, an imaging model, and an application program interface (API).

X Window, or X-Windows as it is frequently called (see the related article on page 6), is an example of a windowing system, but it is not a complete GUI. It is shared by a group of GUIs, making it possible for them to also share programming tools.

Microsoft Windows is a complete GUI. It has its own windowing system, imaging model, and API.

Imaging models define the way that fonts and graphics are created on-screen. PostScript is one of the best-know imaging models, used in laser printers; Display PostScript is the on-screen version. On the Macintosh, the imaging model is QuickDraw.

An API is a set of programming-language function calls. In other words, it defines which windows, menus, scroll bars, and icons will appear on the screen.

Some systems add to the three basic GUI elements and have tools for

creating interfaces and developing integrated applications. NewWave from Hewlett-Packard, for example, is a development tool for application programmers rather than a user interface. NextStep, on the NeXT computer, includes a set of tools for object-oriented programming.

According to Henry and Baran (p. 252), the GUI family tree can be broken into a few large groups: those based on the distinctive look of IBM's SAA; those built upon X Window and the Macintosh and its apparent offshoots; and a few hard-to define hybrids and special cases.

Although SAA is not actually a GUI (Henry and Baran say it is both more and less than a GUI), it has GUIs that are subsets of SAA user interfaces. Some PC-level GUIs that implement SAA are Windows for MS-DOS systems and Presentation Manager (PM) for OS/2. SAA GUIs don't depend on mice, and in fact lean heavily on keyboard eqivalents, including function keys. According to Henry and Baran, "you can gauge the pervasiveness of SAA's influence in the PC world by counting the number of DOS applications that now use the F1 key as the Help key."

X Window user interfaces are a varied lot. The current version of X, the underlying element of all X Window systems, is X11, and it is the most popular windowing system for Unix workstations.

Because X Window GUIs are so varied, the Open Software Foundation is attempting to standardize them as a part of a standard operating environment for Unix. A GUI called Motif has been created that ". . . looks like PM, uses parts of the DEC and Hewlett-Packard APIs (as well as the three-dimensional windows from Hewlett-Packard's NewWave), and is based on X Window." An Imaging model for Motif hasn't been selected yet.

According to Henry and Baran, because of its ability to work on networks, X Window makes distributed computing a real possibility with mouse-and menu GUIs. Unfortunately, response-time is pretty slow. Henry and Baran point out, however, that X Window is currently the only GUI system that really does work in a multiuser, multi-computer, networked environment.

Conclusion

Whatever their incarnation, GUIs and their relatives will be the driving force behind the workstations of the 90s. Hayes and Baran (p. 257) predict that the windows on our workstations will display many interesting things in the years to come: "extremely high-resolution images, multimedia applications, full-motion video, and new ways of interacting with data. Programs like NextStep and NewWave point the way to the future, where intelligent interfaces may not only help you to automate everyday tasks, but may even anticipate your actions and thereby increase productivity."

References

Delaney, Chester, "The Shape of Things to Come," *Data Training* (March 1990, p. 40)

Hayes, Frank and Nick Baran, "A Guide to GUIs," *BYTE* (July 1989, pp. 250-257

Heller, Martin, "Redefining the Standards," *BYTE* IBM Special Edition (Fall 1989, pp. 57-64).

What, Me Worry?

Just when you thought it was safe to stop seeing your analyst, a new neurosis pops up — *Information Anxiety*. Intrigued?Check out the book Information Anxiety by Richard Saul Wurman and find out just how many more things there are to worry about. . .§

X-Windows, the Graphical User Interface of the '90s

By Billy Barron, VAX System Manager
(BITNET: BILLY@UNTVAX)

X-Windows is a device independent, industry standard, graphical interface developed by MIT. It was recently adopted by the Open Software Foundation (OSF) as the standard user interface for Unix though it can also be used for other operating systems. In addition to being a graphical interface, X-Windows is a network protocol, and an application interface specification.

The graphical user interface (GUI) is similar in nature to the Macintosh and the NeXT (Display Postscript). In terms of user interface features, the Macintosh and X-Windows are almost identical. Both offer windows, icons, mice, menu bars, scroll bars, pop-up menus, and pull-down menus. However, he X-Windows graphical interface is the same no matter what operating system and hardware it is running on, whereas, the Macintosh environment is only available of the Mac. This allows the user to switch from computer to computer without learning a new user interface every time.

The networking capabilities of X-Windows is the area in which X-Windows leaves the other windowing systems behind. The architecture of the networking is based on the client-server model where a low cost workstation controls the user interface and a high power server can provide applications and high processing speeds. The network interface is transparent to the user. With this transparent interface, it is possible to execute a program on a remote machine while displaying and inputting data on a local workstation or terminal. The X-Windows network-

ing protocol can utilize many other networking protocol to actually transport the information. The nicest part of the networking is that it works independent of tbe bardware and the operating system.

The application interface provides the programmer a consistent, easy-to-use programming interface. This interface is designed to maximize programmer productivity. X-Windows applications written in Ansi C using the standard application interface are supposed to compile on any X-Windows without system modifications.

Finally, the X-Windows architecture was built for expandability. New technologies such as three-dimensional graphics can be added to X-Windows when they become available. Of course, the extensions must be standardized and be implemented into the various versions of X-Windows.

The X-Windows client requires a high-powered graphics terminal or a workstation to drive the display. The most popular terminals, such as the VT52, VT100, VT240, and 3278, are incapable of using X-Windows. New X-Windows terminals in the $2000 price range are available from several vendors. The X-Windows server will run on any bardware that has the X-Windows server software. MIT provides the source code to the Unix BSD 4.3 version of X-Windows for free. DEC's operating systems VMS and Ultrix (Unix) both now include DECwindows (DEC's version of X-Windows) at no extra charge. Other vendors also bave X-Windows versions available for PCs, Macintoshs, Unix workstations, and central Unix processors.

UNT's Computer Science Department is currently using X-Windows in a very limited fashion. The future of X-Windows on the UNT campus appears very bright. Already, Computer Science and Physics departments are talking about making an investment into X-Windows equipment over the next several years. Also, many other departments have expressed interest in X-Windows technology.

The advantages of X-Windows are many, but the cost of the equipment and the networking to run X-Windows is rather expensive, although it will hopefully drop in the future. If the cost drops sufficiently over the next few years, we may begin to see the end of the traditional text driven operating environments.§

Spring Break Hours

Location	Dates	Times
Computing Center RJE	March 10, March 12-March 17 March 11, March 18	8 a.m.-Midnight noon-Midnight
ISB 110 Terminal Area	March 10 March 12-March 17 March 18	9 a.m.-9 p.m. Noon-8 p.m. 1 p.m.-Midnight
College of Business	March 9 March 12-March 16 March 17 March 18	8 a.m.-4 p.m. 10 a.m.-6 p.m. 8 a.m.-8 p.m. Noon-Midnight
GAB 550C	March 9 March 18	8 a.m. - 5 p.m. 4 p.m.-Midnight
Graphics Lab	March 10, March 17 March 11, March 18 March 12-March 16	Noon-5 p.m. Noon-10 p.m. 9 a.m.-5p.m.
Willis Library	Marchh 10 March 12-March 16 March 18	9 a.m.-9 p.m. 8 a.m.-5 p.m. 1 p.m.-Midnight

Resume Regular Hours Monday, March 19

Areas ara CLOSED on dates not llsted.

The Office of The '90s

By Claudia Lynch, *Benchmarks* Editor
(BITNET: AS04@UNTVM1)

You can look forward to the following things, in the office of the '90's (taken from an article, "The Shape of Things to Come," by Chester Delaney, *Data Training* March 1990, pg. 40):

- Your desktop device will be a "workstation" situated precisely to the needs of your job. It may be a standalone PC, a diskless PC on a LAN, a dumb terminal, a laptop, maybe (over time) a hip-pocket or wrist model. It will be whatever best fits you and your work, and it will be your entry point to a "workbench" mapped to your requirements. If you are a programmer or a systems designer/analyst, your workbench will surely center around a CASE toolkit. If you are a human resource professional—or lawyer, banker, clerical worker, or manager—your workbench will include software tools and data paths you need to do your job. They will be provided irrespective of where the data and tools reside on the network.
- Your network use will be tailored to your particular job needs through your "profile," tagged by your password and ID code. The network will have the intelligence to provide access to the data and the software authorized for your profile —wherever you are on the network (i.e., not necessarily at your customary desk).
- The network will also provide access to colleagues and contacts, inside the company and out, effortlessly transcending time zones, business boundaries and geographies through facilities like e-mail and bulletin boards.

Sound familiar? Welcome to the 90's!§

A Gift of Fire: Social Responsibilities in an Information Age

By Ken Klingenstein,Director, Computing and Network Services, University of Colorado at Boulder

You, Prometheus, stole powers from the gods
And for whom?
. . . Things that live and die! **Prometheus Bound, Aeschylus**

Few inventions have had as consequential an impact on society as has the computer. During the forty years of its existence, and most particularly in the last ten years as microcomputers have evolved, the computer is transforming both the substance and style of our world. There are both direct uses of computers (as in scientific analysis and word processing) and indirect use, where the computer is embedded in another device (as in compact disks and robots). However, as Prometheus' gift of fire to man brought both good and evil, so does the use of the gifts of technology bear careful examination.

One of the major impacts of computing has been the proliferation of information. The ability of a computer to store and retrieve information has resulted in a veritable deluge of data. The rapid growth has led to twin dangers: the disuse and the misuse of information. The disuse of information occurs when there is so much information available that one goes into information shock. Intimidated by the complexity and detail of data, we find it easier to ignore all the facts and proceed on a purely visceral level. On the other band, information is often used as the deciding factor in situations where other concerns — cultural or ethical values, for example — should guide the course. Such misuse of information ignores the essence of humanity.

Computing can further disenfranchise the disadvantaged. The City of Santa Monica, for example, has recently installed an electronic information and mail service between residents and the city administration. By dialing in with personal computers, individuals can access everything from building permits to social services and communicate via email with city officials. Those sections of society which are not privy to computing may suffer as such mechanisms replace more basic methods for the provision of services.

Computing has also enabled activities whose social or ethical value is doubtful. Examples unfortunately abound. The computer has created the rise of the arbitrage trading that is now destabilizing the Stock Market. Computer-based leisure time pursuits are certainly entertaining but can become addictive and push out other recreational outlets that provide a more human outlook. Of greatest concern, the computer forms the basis for the development of monitoring devices that threaten privacy and personal freedoms.

Computers can exert severe financial stresses on society. To date, computers and the information age have probably created as many jobs as automation has taken away (although the workers displaced by automation are generally not the ones who fill the computer-related jobs). However, there is a wave of new industrial robots on the horizon that will eliminate a significant number of jobs. When society no longer has enough work for much of the population, the political and financial effects may be profound.

When computer-human interactions begin to replace some human-human relationsbips, we must be aware of the computer's limitations. This is especially true in education. As computer-assisted Instruction becomes more widespread in the next several years, it is important to recognize the critical value of the human teacher to inspire and catalyze. In recollection, one remembers the great teachers, not the great courses. Human factors such as eye contact, inflection, and passion are elemental to the passing on of the fire we were given.

It should be noted that this plea is not against computing per se. It is neither desirable nor possible to return to the pre-silicon age. Computers have brought a host of important and beneficial effects to society and given us almost god-like powers. However, mortality provides a certain perspective. Much of the business of life is best conducted by us things that live and die.

Recieved from *CCNEWS*, the Electronic Forum for Campus Computing Newsletter Editors, a BITNET-based service of EDUCOM.The original title of the article was "A Gift of Fire."§

New Staff Members

Several new members have been added to the Computing Center staff recently, and several staff members bave changed positions.

- **Abraham John** was hired into the Academic Database support position. He had been a staff member in the office of the Dean of Students.
- **John Dysart**, who had been an equipment operator here in the Computing Center, has joined the Student Records team. **Moses Boateng** was hired to replace John as equipment operator.
- **Patricia Parham** is a new employee in Data Entry.
- **Chad Irby** moved from a part-time position in the Graphics Lab to a part-time position in Microcomputer Support.§

Focus on the Future: An Educational Perspective

By Alison Hartman, Tulane University (BITNET: TACVAGH@TCSVM)

Who will hear the cries of humanity amid the din of the computer age?
David Hartman, the author's father.

In the past 350 years, higher education in the United States has undergone dramatic changes in mission and scope: from a single college in Massachusetts that "trained a literate ministry," to the post-World War II expansion that provided a liberal education for a broad spectrum of the population. Society, too, has changed from one based on an agrarian economy, through the industrialization of mechanized labor, to the brink of a revolution of information in which individuals have access to vast data resources. Higher education and society are inextricably bound, each reflecting the values and expectations of the other, each simultaneously shaping and being shaped by technology.

Despite these metamorphoses, the process of teaching has remained relatively constant. The tools that most instructors use today are those that were used in the classrooms of the past. The surroundings and activities are familiar, safe, and comfortable.

Today, at the gateway to the twenty-first century, it is useful to speculate about the future of higher education. Clearly, information technology has the potential to change the process of higher learning; to a certain extent, it has done so already. Computers are omnipresent on campus, and through satellites, microwaves, and fiberoptics we can transmit text, video, and sound around the world. As the cost of technology drops and computers and networks become even more widely available, we are sure to find new ways to enrich teaching and learning with these tools. How will higher education — and society — change as a result?

Toward an "Information Society"

The technology is the easy part. Today's multimedia productions are the precursor of tomorrow's "electronic books—databases of information stored as text, still and moving images, and sound. Electronic classrooms will be equipped with workstations at which students can take notes, see slides, hear sounds (including speech), watch simulations, and work through problems and exercises. Through high-speed networks, students will easily exchange information with the instructor and with each other. Even students not in the classroom — those for whom distance has historically been an impediment to education — will be able to participate actively in discussions, submit assignments, and review course materials.

If students can see, hear, and respond to the instructor and to other students, if they can view materials, participate in discussions, even exchange information over the network, why do we need "classrooms"? Why not have students participate from their homes and dormitories, instructors from their offices? "Distance learning" holds great promise for the future of higher education as we seek ways to prepare for demographic predictions of an older, more diverse student population. But, as certain barriers are eliminated, we must take care not to erect others.

The question is not whether such a vision will be possible technologically — it is possible now, though costly. Rather, the question centers around mission: will this be an effective, desirable way to educate tomorrow's students? What effect — if any — might the lack of face-to-face contact have on their development and socialization? How will the role of the teacher change, and what effect will "distance" have on the interactions between teachers and students? In the larger view, how will these changes affect the institution's ability to educate our citizenry and contribute to the nation's service?

The answers to these questions lie in research and in dialogue. With objective probing, faculty, administrators, and students will be able to make consensual, data-based decisions, devise creative solutions to problems, and create a flexible environment that will meet the teaching and research needs of a variety of individuals. We must also foster discussion about the issues. Active, participatory exchanges of ideas and information will enable us to direct the integration of technology into the educational process, rather than merely to watch it happen.

At the heart of it all are those who teach and those who learn. Information technology has the potential to improve higher education, but technology alone will not create change. People create change by using technology to work more productively and — if they are fortunate — to accomplish things that would have been otherwise impossible. We have both the opportunity and the responsibility to shape the synthesis of information technology and higher education. How we do so — and to what effect — will determine our future. Change occurs slowly in the tradition-laden academy. But it does occur.

This article appeared in the January 1990 issue of the Tulane Computing Services Newsletter. It was obtained from the Articles database of CCNEWS, a BITNET-based service of EDUCOM.

EQS Available on OS/MVS

By Panu Sittiwong, Academic Computing Services Consult (BITNET: AC09@UNTVM1)

With financial assistance from Faculty Research funds, the Computing Center has recently acquired EQS Version 2.1 for OS/MVS. EQS, marketed by BMDP Corp., is the counterpart of LISREL VI. Both programs are designed to be used to analyze linear structural equation systems. To run EQS from MUSIC/SP on the OS/MVS operating system your Job stream should appear as follows:

```
/INC OSJE
RETURN
// Valid JOB Card ...
// EXEC EQS
//FT08F001 DD *
  Your EQS Program goes here ...
//
```

EQS allows you to perform data analysis based on raw data, correlation matrices, or covarience matrices. By default, EQS expects to have data included in matrix form within the program using the /MATRIX command. The following DD statements are needed if raw data or matrix data are stored on the ACAD Disk packs (see related article in this issue of Benchmark for SPSS-X commands which can be used to produce correlation or covariance matrix):

```
//FTnnF001 DD DSN=user.idnn.mydata,UNIT=SYSDA,
//                VOL=SER=ACADnn, DISP=SHR
```

Where: *nn* is a Fortran logical unit which can be any number less than 99 (except 6, 8, 10, 11, 12); *user.idnn.mydata* is the name of your dataset; and ACAD*nn* is either ACAD00, ACAD01, ACAD02, or ACAD03.

If the raw data are stored in a MUSIC/SP file, your JOB stream should appear as follows:

```
/INC OSJE
RETURN
// Valid JOB CARD ...
// EXEC EQS
//FTnnF001 DD DATA,DLM='$$'
/INC music.filename
$$
```

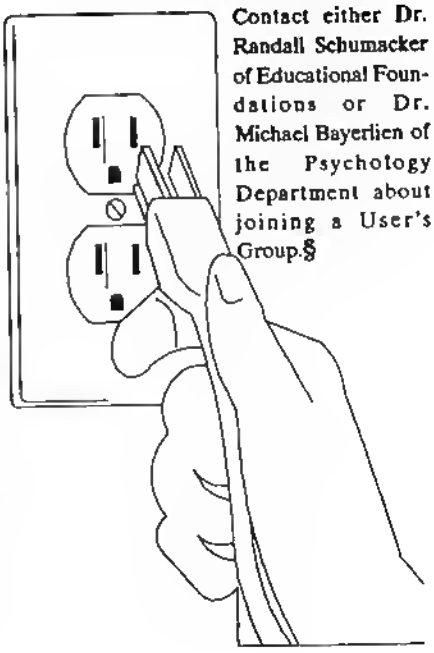
Where: *nn* is a Fortran logical unit which can be any number less than 99 (except 6, 8, 10, 11, 12); *music.filename* is the name of MUSIC file containing the data; and $$ indicates the end of the data lines.

The data are then referred to in the program with the UNIT = *nn* option in the /SPECIFICATIONS command. You will also have to specify the format of the data using a Fortran format statement. For example, the following job setup will read a raw data, contained in the MUSIC/SP file named MY.RAW.DATA, from unit 9 (FT09F001). There are six variables in the dataset, each occupies six columns and implies three decimal places.

```
/INC OSJE
RETURN
// Valid JOB Card ...
// EXEC EQS
//FT09F001 DD Data, DLM='$$'
/INC MY.RAW.DATA
$$
//FT08F001 DD *
/TITLE
  My Famous Model
/SPECIFICATIONS
  CAS=932; VAR=6; UNIT=9;
  FORMAT=(6.F6.3)
  The rest of the EQS commands ...
/END
```

More information on using EQS can be found in the *EQS User's Manual.* The manual can be obtained directly from BMDP. The phone number is (213) 479-7799. You should buy the Version 3.0 manual since BMDP plans to upgrade EQS to version 3 shortly.§

Get Plugged-In to The Latest Information on LISREL and EQS



Contact either Dr. Randall Schumacker of Educational Foundations or Dr. Michael Bayerlien of the Psychology Department about joining a User's Group.§

Preparing Correlation or Covariance Matrices for EQS or LISREL

By Panu Siltiwong, Academic Computing Services Consultant (BITNET: ACO9@UNTVM1)

Although both EQS and LISREL allow you to use raw data as the input, most people prefer to use matrix data input. Unlike LISREL PC, which provides a PRELIS program for converting raw data to matrix data, mainframe LISREL, EQS/PC and EQS mainframe do not provide such a capability. If matrix data are to be used, unless you know how to generate one, you will have to create a matrix data file using a word processing program. Creating a matrix data file with a word processing program is cumbersum and very time consuming, especially when one is working with a complex model involving a large number of variables. This article will show sample programs which can be used to create both correlation and covariance matrices using SPSS-X and SPSS/PC.

SPSS-X Program

SPSS-X provides several procedures which are capable of outputing a correlation matrix. The most simple procedure is CORRELATION. Figures 1 and 2 demonstrate all the SPSS-X commands neccesary to generate correlation and covariance matrices. Output will be in a punch dataset which you can save to a MUSIC/SP file with the command:

```
OUT D=PUN,FILE=music.filename
```

This command is entered after you are in OSJR. Type OSJR at MUSIC/SP *GO to get into OSJR.

Figure 1: Sample SPSS-X Program Command File

```
/INC OSJE
RETURN
// Valid JOB Card ...
// EXEC SPSSX
//MATRIX OO SYSOUT=B,
//                DCB=(LRECL=80,BLKSIZE=80,RECFM=F)
*-------------------------------------------------------
* Sample SPSS-X Program to create Matrix Data
*-------------------------------------------------------

OATA LIST /v1 to v12
—— Some other SPSS-X commands ...
BEGIN DATA
/INC raw.data
END DATA

* Using the CORRELATION command to compute a correlation
* coefficient and output the correlation matrix as an active data file

CORRELATION VAR = v1 to v12
  /MATRIX

* Now select the portion of the matrix which contains the correlation
* coefficient and change the default format to F10.7

SELECT IF (ROWTYPE_='CORR')
WRITE FORMAT v1 to v12 (F10.7)

* Now write the matrix to the output file. Since the maximum allowable
* output file is 80 cloumns, and we are using 10 columns for each variable.
* The output file can have only 8 items per line.

WRITE OUTFILE=MATRIX /v1 to v8 (8F10.7)
                     /v9 to v12 (4F10.7)
EXECUTE
```

Figure 2:SPSS-X Commands for Outputing a Covariance Matrix

```
*-------------------------------------------------------
* This section is needed if a covariance matrix is desired.
*-------------------------------------------------------

CORRELATION VAR = v1 to v2
   /MATRIX OUT = *

MCONVERT /MATRIX=IN(*) /MATRIX=OUT(*)

WRITE FORMAT v1 to v12 (F10.7)
WRITE OUTFILE=MATRIX /v1 to v8 (8F10.7)
                     /v9 to v12 (4F10.7)
EXECUTE
```

SPSS/PC+ Program

The REGRESSION procedure in SPSS/PC+ allows you to write an output matrix file. Information that can be included in the matrix file are correlation, covariance, means, standard deviation, variance, and number of cases. Since REGRESSION in SPSS/PC+ is a procedure command, you will need to have all the appropriate suh-commands as if you are running regression. Figure 3 shows the basic SPSS/PC+ commands to create a covariance matrix.

Figure 3: Sample SPSS/PC+ Program

```
DATA LIST FREE FILE='myraw.dat'
  /v1 to v12.

* Assign the covariance output file to 'covmat.dat'

SET RESULT='covmat.dat'.
REGRESSION VAR=v1 to v12
  /DEPENDENT=v1
  /METHOO=ENTER
  /WRITE=COV
```

By default, SPSS/PC+ writes the matrix output using F10.3 format. Figure 4 shows additional SPSS/PC+ commands which will change the default format to the one that you specify.

Figure 4: Sample SPSS/PC+ Program Changing Default Format

```
REGRESSION VAR=v1 to v12
  /DEPENDENT=v1
  /METHOD=ENTER
  /WRITE=cov

* Now read the matrix data

DATA LIST FREE FILE='covmat.dat'
  /v1 to v12.
SET RESULT='newcov.mat'.

* Change the default format to F6.3

FORMAT v1 to v12 (F6.3)
WRITE VAR=v1 to v12.
```

After the matrix file is written, you are ready to use it with LISREL and EQS. Since the matrix produced by both SPSS-X and SPSS/PC+ is a symmetrical matrix, you will need to specify it as such in your LISREL or EQS program. For LISREL, you can specify either FU or SY on the MM, CM, or KM card. For EQS, you will specify the FORMAT = '(format'; option in the /SPECIFICATION command.§

Remote Searching of Louis Harris & Associates Data

Taken from information provided by David Sheaves (919-966-3348 or uirdss@uncvm1.bitnet) and Jim Cassell (919-962-0514 or cassell@UNCVM1.BITNET), University of North Carolina

Any researcher with access to the Internet can now search the Louis Harris and Associates data holdings at the Institute of Research in Social Science (IRSS) at the University of North Carolina, Chapel Hill. Keywords in combination can be used to locate items of interest. Soon the search will also display frequency distributions for each question retrieved.

IRSS Data Services can be reached through the internet from the UNT VAXcluster. The Internet address for UNCVM1 is:

UNVM1.ACS.UNC.EOU

or

128.109.157.5

After loging on the VAX, to connect to UNCVM1, type:

TELNET UNCVM1.ACS.UNC.EOU

or

TELNET 128.109.157.5

When you connect to UNCVM1, you'll see the standard VM logon banner. Press <ENTER> to clear the screen and type:

LOGON IRSS1 IRSS

or

LOGON IRSS2 IRSS

and follow the menus. The procedures should be self-explanatory from this point on.§

Report Writer for COBOL II

By Philip Baczewski, Mainframe User Services Manager (BITNET: AC12@UNTVM1)

Report Writer for COBOL II, release 3.0 is now available on the Academic MVS as well as CMS operating systems. With the introduction of COBOL II, Report Writer was no longer an integral part of the COBOL compiler. For this reason, the use of a precompiler is necessary to process Report Writer statements within a COBOL II program. For most efficient use of this product on either operating system, refer to the following publications available from IBM:

- *COBOL Report Writer Precompiler Installation and Operation*, (SC26-4302-1)
- *COBOL Report Writer Precompiler Programmer's Manual*, (SC26-4301)

On MVS, this product will be considered in test mode while initial use is begun and unless serious problems are found during the initial test period, the system will automatically be considered "in production." To execute the COBOL Report Writer with COBOL II release 3.0, execute one of the UNT standard catalogued procedures:

- COB2RCLG- REPORT WRITER PRECOMPILE, COBOL II COMPILE, LINK AND GO
- COB2RCL- REPORT WRITER PRECOMPILE, COBOL II COMPILE, AND LINK
- COB2RC- REPORT WRITER PRECOMPILE AND COBOL II COMPILE
- COB2RCG- REPORT WRITER PRECOMPILE, COBOL II COMPILE & GO (LOADER)
- COB2RG- REPORT WRITER "GO" PROCEDURE
- COB2RLG- REPORT WRITER LINK AND GO PROCEDURE

The default options for the MVS Report Writer precompiler are set as follows:

NOADV, APOST, COBOL(2), COLL, COMLIN, COMP, COPY, CTRNLEN(80), NOEXTFLG, FLAG(I), NOLENMAP, NOLGENER, LIB, LINECOUNT(57), MSGL(0), PPSNS(12), SOURCE, SPACE(1), OSVS, XCAL

These current options were chosen for compatibility with the options as set on the COBOL II release 3.0 Product under MVS, which has its options set for consistency with the VS COBOL 2.4 Product. You may override these settings on the "EXEC" card if other options are desired.

The Report Writer precompiler for COBOL II is also available on CMS. To invoke the precompiler on CMS, first enter NTLINK RWCOBOL and then issue the command: RWCOBOL <filename>RWCOBOL <filemode> (<options>

RWCOBOL is the command for invoking the Report Writer Precompiler, <fileame> represents the name of your file containing COBOL II and report writer source statements, RWCOBOL is the file type required for Report Writer source files, and <filemode>represents the minidisk on whicb the source file is stored. If RWCOBOL is the file's type and the file is stored on the "A" disk, then the format RWCOBOL <filename> (optlons may be used.

For more information on using the RWCOBOL command on CMS, enter HELP RWCOBOL after you have issued the NTLINK RWCOBOL command.§

Museum of Interactive Multimedia Opens in Washington DC

Taken from an article "TECH2000: New Hands-On Museum Opens in DC," that appeared in The Newsletter for the Office of Information Tecbnology, *James Madison University, Volume III, Number 2.*

TECH2000, the world's first museum of interactive multimedia, opened to the public February 5, 1990. Visitors can experience, hands-on, the latest in interactive video, information and communications technologies in the areas of education, training, information management and entertainment. Located in Techworld Plaza, a trade center-office-hotel complex near the Washington, DC Convention Center, TECH2000 is expected to attract balf a million visitors a year. With interactive media loaned or contributed by nearly 100 companies, the museum is constantly changing and staying up-to-date.

Many of the exhibits simulate real life situations that require the user to make immediate decisions that affect the outcome of the simulation. In an exhibii for sales training, the student's actions determine whether or not a sale is made. In an exhibit for training medical personnel working with medical emergencies, the student's actions determine whether the patient will live or die.

Interactive video games demonstrate bow a user can control computer technology from a distance without physically touching anything. A video camera detects the player's movevemnts in open space. The real world image is then combined witb computer anomation and displayed on a television mintor. The player manipulates the game by moving his or ber body to"toucb" the

computer's graphics images. For example, the computer shows a picture of drums with the player's body superimposed. By moving hands and feet, the player can play synthesizer drums. In the adventure games, players are challenged both physically and mentally by the animation as they progress through various video scenarios that require agility, speed, flexibility, memory, awareness and deduction.

Tbe muesum is open Tuesday througb Friday, 11 a.m. to 6 p.m. (until 9 p.m. on Thursday), Saturday, 10 a.m. to 6 p.m., and Sunday 10 a.m. to 5 p.m.. Admission is $4 per person. For more information, call or write:

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Techworld Plaza
B00 K Street, NW
Suite 60
Washington, DC 20001
(202) 842-0500 §

Type "1" and Call Me in the Morning

According to an article in *Health InfoCom Network News* (Volume 3, Number 5, February 10, 1990), *USA TODAY* reported that a new computer program has been developed to teach patients ways to overcome depression. Psychotherapists in Mesa, Arizona found that over a six-weeks period, 12 mildly to moderately depressed patients improved as much interacting for an hour-a-week with with the computer program as a similar group of patients who saw a therapist weekly. Creators say that the high-tech therapy will not replace therapists.§

THE BITNET CONNECTION

By Philip Baczewski, BITNET INFOREP (BITNET: AC12@UNTVM1)

This Column is a continuing feature of ***Benchmarks*** *intended to present news and information on various aspects of the BITNET wide area network.*

BITNET In the Nineties

The decade of the eighties has seen BITNET grow from a small research project to an indispensable tool for exchanging information between educational and research institutions. BITNET consists of 1750 nodes across 500 member institutions. BITNET together with cooperating networks in other countries form a logical network connecting 1300 sites in 38 countries spanning five continents.[1] With the growth of BITNET, however, has come an increased level of complexity in the central management of the network. BITNET's architecture as a store and forward network, with each site connected by one leased line to the next, has encouraged the growth of a network without an formal, organized structure. The lack of formal structure is now being felt by system managers throughout BITNET as they try to implement complex routing tables, and by BITNET users as their mail or files must "hop" through a multitude of sites before reaching a final destination.

A proposal to the CREN[2] board originating from Princeton University seeks to solve some of the problems and eliminate some of the complexity in BITNET's structure. This proposal suggests using the existing regional and national TCP/IP networks to organize BITNET into seven regions with two "core" sites per region. Each of the core sites would be connected, using RSCS format carried via TCP/IP, to every other core site. These core sites would form a "backbone" for the BITNET network. Core sites within a region would be connected via RSCS/IP to mid-level sites and other sites could then connect to the mid-level site via RSCS/IP, DECNET, or leased-line methods.

The "regionalization" proposal offers several advantages over the current structure. The burden will be lessened on current "hub" sites because a smaller number of files will need to pass through those sites. Network service would be improved by reducing the number of "hops" a file would take to reach its destination. A failure of one major site would no longer cut off a large portion of the network from the rest of the network.

It needs to be noted that, so far, this plan is still in the proposal stage. It is currently being discussed in the BITNET community via tbe Node Managers' SIG list (NODMGT-L@BITNIC). If you are interested in learning more details

[1] This information on nodes and sites was taken from the file BITNET OVERVIEW, available from LISTSERV@BITNIC and also available as a public file on MUSIC called BITNET. OVERVIEW.

[2] CREN (Corporation for Research and Educational Networking) is the governing body of BITNET and CSNET. See the November/December 1989 *Benchmarks* "BITNET Connections" column for more details.

of the plan you can examine the file BIT2PLAN.PROPOSAL on MUSIC (the file BIT2PLAN PROPOSAL is available from LISTSERV@BITNIC also). It may also be of interest to note that Texas already has a regional network in place. Through the cooperation of several Texas Universities, a "triangle" hub exists linking UT-Dallas, UT-Austin, and UH, providing alternate network routing paths in the event of an outage. A similar regionalization is developing in the state of North Carolina.

Whether or not the Princeton proposal is adopted, it seems that BITNET is destined to undergo a movement towards regional organization. As can be seen in Texas, organization within a region leads to more efficient and reliable wide area networking services. This is good news for BITNET users. The decade of the nineties should see an even greater level of useful information exchange via BITNET. §

LIST of the Month

Each month we will highlight one of the BITNET LISTSERV Special Interest Group (SIG) mailing lists. This month's list...

FUTURE-L@BITNIC

Coordinator: BITNET Network Information Center (INFO@BITNIC)

FUTURE DEVELOPMENTS IN BITNET: A discussion of the development and possible implications of introduction of X.400 mail systems, RSCS version 2, alternative transport protocols such as TCP/IP, a domain naming system for BITNET.

This list may be of interest to those wishing to know more about the future directions of BITNET. The discussion is primarily targeted towards those providing systems support at BITNET nodes, however, it may also be applicable to those seeking general information on wide area networking technologies. To subscribe to this list send the following command via interactive message or as the first line of a mail message to LISTSERV@BITNIC: SUB FUTURE-L <firstame lastname.>

BENCHMARKS FORUM

BENCHMARKS FORUM is intended to serve as a vehicle for answering questions that may be of general interest to the user community. If you have a question, please send electronic mail to the Benchmarks editor (BITNET: AS04@UNTVM1) or write it down and drop it by the Computing Center. We will try to answer it in the next issue.

Question: *If BITNET and CSNET merged, why does everyone still call it BITNET?*

Answer: It is true that CREN, Corporation for Research and Educational Networking, replaced BITNET INC. as the governing body of the BITNET network (see "The BITNET Connection" column in the November/December 1989 issue of *Benchmarks* for more details). The network itself, however is still called BITNET.

Question: *How do you change your password on CMS?*

Answer: On CMS, type DIRM PW and follow the instructions.

Question: I have noticed that some people have their names as their ID-codes. How can I do that?

Answer: Named accounts are only available to people who have faculty or individual accounts, i.e. not classroom IDs. Additionally, named accounts are available only on VAX/VMS and VM/CMS. In order to get a named account, come by the Computing Center Offices, ISB 119 and fill out the "Request for Named Userid" form. Requests for individual ID-codes are also available in ISB 119. Students will need a faculty sponsor in order to get an individual ID. §

Benchmarks **Reader/User feedback is encoureged. Send all letters, suggestions, etc to (AS04@UNTVM1), FAX 817-565-4060 or to the** *Benchmarks* **Editor at:**

Academic Computing Services
University of North Texas
Computing Center
NT Station,
Box 13495
Denton, Texas 76203

It's Always Something ...

Immediately after publishing the article "FCC Moves to Regulate Modem Usage" in the January/February 1990 issue of *Benchmarks*, we received the following retraction from the news.announce.important Newsgroup:

> Recently a message announcing that the FCC is considering a surcharge on modem users has been showing up on USENET in various groups. Research has shown that there is no basis for this letter — it seems to be an accidental re-release of a 2 year old message. The FCC is not considering any surcharge of any kind, and they are currently getting about 200 letters a day on the subject (that they would like to see stop coming). The Talk Show host mentioned in the letter (Jim Eason of KGO) has been pestered by a lot of ealls (including the FCC) wondering what was going on, and hasn't been involved in the issue in two years.
>
> Please STOP posting or distributing this message. If you have a copy, destroy it. It is obsolete and causing problems on networks and BBSes nationwide. There is no proposal on the docket and none being considered. We need to wipe this silly thing out before things get further out of hand.

We apologize for any aggravation this may have caused you.

On a similar note, the article "Willis Library Lab Fully Operational," in that same issue of *Benchmarks*, failed to mention that part of the funding for the Willis Library Lab came from UNT. The remainder of the funding, as was noted in the article, came from a grant from Novell.§

The Computing Center is offering the following short courses for the 1990 Spring Semester. Please pre-register to attend (a registration form can be found at the end of this issue). **A maximum of 10 people will be admitted to each of the courses held in ISB 110. A maximum of 7 people will be admitted to each of the courses held in the Graphics Lab. A maximum of 8 people will be admitted to each of the courses held in ISB 123.**

PLEASE NOTE: Faculty and students have first priority to register for these classes. staff members ** MUST ** register through the personnel office.

MAINFRAME COURSES

1. **Introduction to MUSIC/SP** - MUSIC/SP is the primary interactive operating system employed by most academic users to access the Academic HDS/8083 IBM-compatible mainframe computer at UNT. MUSIC users have access to a variety of programming languages, a sophisticated word processing system, and several statistical analysis packages. MUSIC also gives you the capability to submit batch jobs to the MVS operating system. Topics covered include gaining access over the Local Area Network, logging on and off, changing your password, and creating, editing, and storing files using the full-screen editor. Additional topics that may be covered, depending on available time, are: accessing on-line help facilities, using electronic mail, routing output to high-speed printers, and writing files to secondary storage such as disk and tape.

   Introductory sessions to MUSIC/SP are held in Room 110 of the Science Library (ISB) on a weekly basis. **NO PRE-REGISTRATION IS REQUIRED FOR THESE COURSES.** Consult the HELP DESK (565-4050) to confirm class dates and times. All courses will be taught by Help Desk staff.

2. **Introduction to SAS** - SAS is one of the most widely implemented data analysis systems within business and education. SAS is particularly well suited for dataset manipulation and includes an extensive procedure library providing a wide range of analytical tools. This course is recommended for individuals who plan to incorporate statistical analyses into their research. Topics covered include the reading of data into SAS, simple data transformations recoding variables, labeling output, and per-

forming simple univariate and bivariate analyses.

A two-hour session to be held in the Academic Computing Conference Room (ISB 123):

- Monday, March 26: 6-8 p.m. Instructor: Panu Sittiwong

3. **Introduction to SPSS-X** - SPSS-X is the latest version of this popular data analysis system originally developed for social scientific research. While SAS is slightly more powerful for the analysis of complex datasets, many users find SPSS-X to be easier to learn. SPSS-X also includes more flexible facilities for collapsing and labeling variables. This course is recommended for individuals who plan to incorporate statistical analyses into their research. Topics covered include the reading of data into SPSS-X, simple data transformations, recoding variables, labeling output, and performing simple univariate and bivariate analyses.

   A two-hour session to be held in the Academic Computing Conference Room (ISB 123):

   - Thursday, March 29: 3-5 p.m. Instructor: Phanit Laosiritat

4. **Advanced Data Management In SAS and SPSS-X** - Covers procedures available to simplify reading and processing of datasets, including matching and concatenating files, transposing datasets, and writing datafiles to be used with other programs. You will learn how to use simple JCL along with the statistical software to make your jobs run much more quickly and smoothly. **Prior knowledge of SAS or SPSS-X required.**

   A one-hour session to be held in the Academic Computing Conference Room (ISB 123):

   - Monday, April 2: 3-5 p.m. Instructor: Panu Sittiwong

5. **Introduction to CMS** - CMS is an interactive operating system employed by some academic users to access the Academic HDS/8083 IBM-compatible mainframe computer at UNT. CMS users have access to a variety of programming languages, a sophisticated text processing system, and several statistical analysis packages. CMS also gives you the capability to submit batch jobs to the MVS operating system. Topics covered include gaining access over the Local Area Network, logging on and off, changing your password, and creating, editing, and storing files using the full-screen editor. Additional topics that may be covered, depending on available time, are: accessing on-line help facilities, using electronic mail, and routing output to high-speed printers.

   A two-hour session to be held in the Academic Computing Conference Room (ISB 123):

   - Tuesday, March 27: 3-5 p.m. Instructor: Philip Baczewski

MICROCOMPUTER COURSES

1. **Introduction to WordPerfect 5.1** - An Introduction to the major features of WordPerfect 5.1 including cursor movement, deleting and inserting keys, changing margins and spacing, using current system date, blocking and moving, speller, thesaurus and printing documents. **Prior knowledge of basic DOS commands required. Bring one 5 1/4" low density formatted diskette. There is no difference between WP 5.1 and 5.0 at the introductory level. If you are comfortable with 5.0 do not take this class.**

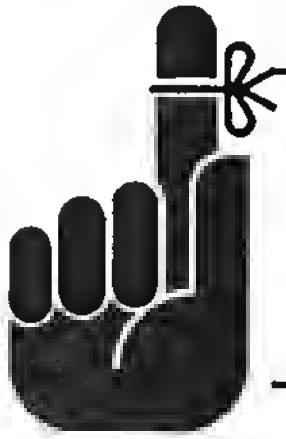
   A three-hour session to be held in Room 110 of the Science Library (ISB):

   - Friday, March 30: 1-4 p.m. Instructor: Sandy Franklin

2. **Advanced WordPerfect 5.1: Manuscripts** - This class covers using a Master Document and related sub-documents, style sheets for consistent headings and subheadings, creating tables of contents, creating indices and sorting bibliographies.

   A three-hour sessions to be held in the Science Library (ISB 110):

   - Friday, April 6: 1-4 p.m. Instructor: Sandy Franklin§



Faculty Members: Don't forget you can request "customized" short courses for your classes. These will be taught by Academic Computing Services staff. Call 565-2324 for more information

MICROCOMPUTERS

The Shopper's Guide to Computer Jargon

It's that time of year again; time to decide what to do with that whopping income tax refund. The following article, reprinted from Campus Computing *(January 1990) the University of British Columbia Computing Services' newsletter gives you some tips if you decide to shop for a microcomputer. The original article, by Greg Scott, appeared in* U-M Computing News, *November 13, 1989. — ed.*

Have you been shopping for a microcomputer lately? Or do you just read advertisements for micros? If so, you will know that these ads are packed with statistics by which each vendor hopes to prove that its low-cost system is as powerful if not more powerful than the system advertised a few pages back. The computers in these ads will be MS-DOS machines, of course — with only one vendor, Macintoshes are scarcely advertised at all. With all the new Macintosh models, however, MAC shoppers will find technotalk as much of a problem as their DOS brethren. Definitions for a few of the most common terms used to tout computers are in order.

CPU end Memory Statistics

The most widely cited statistic that describes a CPU's performance is the clock speed of the CPU, measured in megahertz (MHz). A MHz is simply a million ticks of the system's clock each second. A 4.77MHz CPU like the 8088 in the original IBM PC, therefore, has a clock that ticks 4,770,000 times a second. Most 8088-based computers sold today are faster than this, and run at 8 or 10 MHz. Clone-makers often refer to 8088 systems with these faster clock times as "turbo" systems. This is an abuse of the language; a turbo-charger is a device that forces extra air into an internal combustion engine. You really wouldn't want one on your computer. Higher CPU speeds will improve the performance tasks that make heavy use of the CPU, such as spreadsheet calculations, but won't do much for tasks slowed mostly by how long it takes to read from or write to a disk, such as manipulating large databases.

A powerful CPU like the Motorola 68030 will operate much faster than an older chip in the vendor's product line, such as a 68000, even when both chips run at the same clock speed. In order to compare different chips — even chips from different designers, such as the Intel 80x86 series and the Motorola 680x0 line — advertisements often refer to MIPS, or millions of instructions per second. The test that determines MIPS is actually a standardized, general-purpose test known as the Dhrystone, the results of which have been normalized against the DEC VAX 11/780 minicomputer.

One characteristic of a CPU that a vendor may avoid mentioning unless it is attractively low is the number of "wait states" the CPU uses. If CPU speed is too fast relative to the rest of the system, wait states may have to be inserted so that the CPU does not overwhelm the system by emitting information faster than the other components can make use of it. A system that advertises "zero wait states" is a system that has been carefully balanced; the rest of the machine can keep up with the CPU.

The speed with which memory chips can manipulate information is measured in nanoseconds (ns), or billionths of a second, between consecutive memory accesses. The fewer the nanoseconds, the faster the chip. Older systems often used memory chips rated at over 200ns, which sounds quite fast and is quite fast. Some high-performance systems, however, can take advantage of even faster memory. 120, 100, or even 80ns memory may be necessary to eliminate wait states. The unit of memory manipulated by a bank of chips depends on the number of bits the CPU can handle simultaneously. For example, a 16-bit CPU with zero wait states using 100ns chips can store or retrieve 16 bits of data at a maximum speed of once every 100 nanoseconds.

Some vendors use an additional trick to speed up perceived CPU perfor-

One characteristic of a CPU that a vendor may avoid mentioning uless it is attractively low is the number of "wait states" the CPU uses.

mance — a memory cache to store the data most recently accessed by the CPU. Since the data the CPU looked at last is very likely the same data the CPU will have to look at next, a cache consisting of a small amount of very high-speed memory — as fast as 25ns — can improve performance. Such very high-speed memory may consist of "static RAM," as opposed to the "dynamic RAM" used for ordinary memory. Dynamic RAM chips cannot store memory for long — the CPU must "refresh" them regularly. Static RAM chips can hold an electrical charge longer and do not need to be refreshed so frequently, saving the CPU time for other chores. They also cost considerably more.

Statistics That Describe Disk Drive Performance

The capacity of a hard disk drive measured in megabytes (e.g., 20M) is obviously an important statistic, which speaks for itself. One bit of jargon relating to capacity needs to be explained — "RLL," or run-length limited coding. Some vendors speak of RLL as if it were a performance enhancement in and of itself. Actually, RLL is simply a way of storing half again as much information on a given disk as is possible with the more tradidional modified-frequency-modulation (MFM) coding. An RLL drive may offer high rates of speed, but RLL by itself does not constitute a performance advantage — an RLL drive is no more desirable than an MFM drive of equivalent capacity.

Indeed, early RLL drives were more notable for the frequency with which they broke down than for their high speed, though this problem has been solved on more recent RLL models.

On the other hand, there are hard drive interfaces that can provide higher speeds than either MFM or RLL. The two faster interfaces that are widely used on DOS machines are SCSI (small computer system interface [pronounced *scuzzy* — ed.]), which is also used by the Mac, and ESDI (enhanced small device interface), which is potentially even faster than SCSI.

A standard statistic that hard drive vendors universally cite to describe the speed with which information can be read from or written to a drive is the mean or average seek time, that is, the mean time it takes a drive to find a random location on a disk. Mean seek time is measured in milliseconds (ms), or thousandths of a second. Note that a 40ms 30M drive is actually half again faster than a 40ms 20M drive, since the 30M drive has to search through half again as much disk to earn a 40ms rating. Any 40ms drive, regardless of size, will of course take the same amount of time to find your information — even though the larger-capacity drives must work harder to do this.

Real-life hard drive usage consists of many tasks other than random seeks, and there are less widely-used statistics that attempt to measure some of these tasks. A program may need information that is organized, rather than random. Sequential seek time gauges such usage — it is a measurement of the time the drive takes to move from one track to the next. Another common statistic is the data transfer time, which measures the speed with which information, once located, is transmitted to the CPU. Data transfer statistics are often given in kilobytes per second.

A final commonly-cited statistic that bears on a hard drive's performance is the interleave ratio. Given the high speed at which hard drives rotate, hard drive controllers traditionally were unable to transfer information to and from the drive fast enough to store the information in contiguous, sequential sectors. Therefore, the drive would read or write in one sector, and then skip two, three or more sectors before reading or writing again. The number of sectors skipped gives the interleave ratio — 3:1 if the hard drive's head addresses every third sector. Obviously, interleaving wastes time. Modern, high-speed controllers are often capable of offering a "1:1 interleave" (in other words, no interleave) and vendors who offer this feature advertise it. A 1:1 interleave will markedly improve a system's data transfer time.

Some vendors use an additional trick to speed up perceived CPU performance — a memory cache . . .

DOS Video Display Standards

All Macintosh video displays, large or small, conform to the same graphics standard that Apple built into the Mac. The QuickDraw language is used to control what appears on the screen. Every pixel, or dot on the screen, can be individually controlled. The world of DOS video has not been so pleasantly simple, and a variety of screen control standards exist.

IBM's Original Display Standards

When Microsoft released the MS-DOS operating system in 1981, many people assumed that software programs would control the computer's video display through the operating system. As matters turned out, using the operating system to control the display was extremely slow — too slow for most software developers. Programers quickly learned to write code that would bypass MS-DOS altogether. Much software even bypassed the basic input/output system (BIOS) that lies beneath MS-DOS (The BIOS is permanently written into the IBM PC's ROM). Instead, programmers would write code that took direct control of the computer's screen.

The resulting software provided faster displays for those who own IBM PCs — but such software usually couldn't run at all on MS-DOS systems that failed to emulate IBM's own video display hardware. Software publishers had no incentive to write "display drivers" for each of the many video displays produced by low-volume MS-DOS vendors. Thus, the need to run IBM PC software forced vendors to standardize their video display technology, and to make their hardware compatible with IBM's.

The original IBM PC offered a choice of video displays. The Monochrome Display Adapter (MDA) was IBM's video controller card for monochrome monitors. MDA screen displays are 720x350 pixels. Characters of text are formed by 7x9 pixels in a 9x14 pixel box. The resulting text is very easy to read. The MDA card, however, cannot address individual pixels on the CRT. Its memory contains descriptions of 256 individual characters that it can draw in the 2,000 pixel boxes that it can address. If a shape can't be drawn by placing a character in one of the pixel boxes, MDA can't draw it.

IBM's main alternative to MDA on the PC was the Color Graphics Adapter (CGA). CGA has text modes that draw the screen character by character, but also graphics modes that can draw the screen pixel by pixel. Graphics modes include 320 x 200 pixels in four colors and 640 x 200 in two. Drawing the screen pixel by pixel is quite slow — hence the CGA text modes. CGA text modes also offer more colors — eight background colors and 16 for the text. CGA text, however, is limited to 640 x 200 pixels, which yields character boxes of only 8 x 8 pixels, and characters that are only 5 x 7. To anyone used to MDA, CGA text can be intolerably fuzzy.

Hercules: Monochrome Graphics

MDA does no graphics; CGA text is crude. As a result, people who wanted to do graphics on an IBM PC-compatible but who also wanted an adequate text mode had to purchase two display-controller cards and two monitors for the same machine. (In fact I own a Zenith that is so equipped.) This was obviously an unsatisfactory solution. Compaq Computer launched itself as a leading IBM PC-compatible maker not only to offering a transportable model before IBM did, but because the display on that transportable can support both MDA and (monochrome) CGA graphics.

Compaq's solution, however, did not catch on. Hercules Computer Technology became the company that provided the standard solution to the problem of how to offer monochrome graphics and MDA-quality text on the same monitor. The Hercules monochrome graphics card fits in the IBM PC and all its compatibles. It provides a screen of 720x350 pixels, and hence a 9x14 character box, just like MDA. The Hercules card also offers a 720x350 graphics mode — sharper than CGA, if only in monochrome.

The Hercules card sold well; software houses wrote drivers for it into their products; the number of programs supporting the standard helped Hercules sell even more cards. The sure sign that Hercules had created a standard in an IBM world came when low-cost vendors started cloning the Hercules card. Today, most of the "monochrome graphics" cards offered with cheap cloned systems are in fact Hercules-compatible.

IBM's Higher Resolution Color Standards

In late 1984, IBM came out with the Enhanced Graphics Adapter (EGA), which can support a display of 640 x 350 pixels. EGA can proide up to 16 colors at once in either text or graphics modes. In text mode, it provides an 8 x 14 pixel character box — almost but not quite as good as MDA. Initially quite expensive, EGA was seen as the Cadillac of display systems. By now it costs much less, IBM itself no longer offers it, and many clone vendors are phasing it out as well.

The two display adapters IBM does offer are the MultiColor Graphics Array (MCGA) on the PS/2 Models 25 and 30, and the Video Graphics Array (VGA) on Models 30 286, 50,50 Z, 50 SX, 60, 70, and 80. MCGA is compatible with CGA modes, but can also support graphics at 640 x 480 pixels. If the resolution is kept down to 320 x 200, MCGA can display up to 256 colors at once. Its text mode is effectively 640 x 400, yielding a character box of 8 x 14. So far, other manufacturers have not chosen to clone MCGA, and it does not seem likely to become a standard.

VGA cards, on the other hand, are now available from most vendors. Not all VGA cards are created equal. Some cards can only display VGA modes if software addresses the modes through the BIOS. Not every software program attempts to address the screen through the BIOS,

however, and so these "BIOS-compatible" VGA cards could spend much of their time functioning as over-priced EGA cards. VGA cards that are compatible with IBM's VGA hardware are preferable — they are called "register-compatible."

VGA graphics modes offer 16 colors at 640 x 480 pixel resolution, and 256 colors at 320 x 200 resolution. Text mode offers 720 x 400 resolution, which yields a 9 x 16 charater box — the first MS-DOS color standard that is better then MDA.

Are We Ready for the Ads?

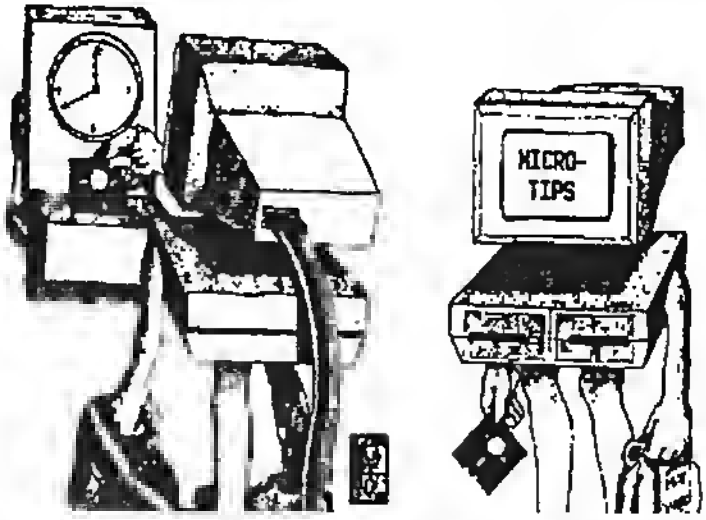
Now that I've explained al that, here's test: "The Swan 286/12 has a 12.5Mhz 80286 with 512K RAM expandable to 5M on the system board, 0 wait states. With a 32M, 40ms, 1:1 Interleave hard drive and EGA video, the price is $1698. With a 48M, 28ms, 1:1 Interleave hard drive and VGA, the price is $1,898." Have you got that? Why are you blinking?§

MAC Virus Alert

A particularly troublesome virus has been sweeping Macintosh communities by storm. WDEF, as this new virus is called, can be spread simply by inserting an infected disk into a MAC — before Vaccine or similar utilities have a chance to detect it.

Symptoms of infection are repeated crashing, particularly MAC IIci's; problems with AppleTalk networks with Apple Share servers; and problems with the display and printing of certain type styles.

A new utility called Gatekeeper Aid, fortunately, is available to protect you from this bothersome virus. It is available on many BBS' and On-line services, including the UNT BBS. Consult the Help Desk or the Graphics Lab for more information.§



This column is intended to serve as a forum for sharing useful tips on making more productive use of microcomputers. If you have a tip that you feel may be of use to campus users, submit it to the Benchmarks editor for possible inclusion in a future issue.

Change Your DOS Screen Colors

Your boss bought you the color monitor that you so rightly deserve. You've customized the WordPerfect screen colors to reflect your good taste and dynamic life-style. But when you return to the DOS prompt, your sense of aesthetics is violated by an ugly black and white screen. Fortunately, DOS's ANSI.SYS device driver and PROMPT command solve this problem. After following the instructions below, you will never have to face a monochrome DOS screen again.

1) **Loading the ANSI.SYS driver.** An IBM compatible computer loads the drivers specified by the CONFIG.SYS file at start up time. Add the line DEVICE=C:\DOS\ANSI.SYS to your CONFIG.SYS file and reboot your system to load the driver. I am assuming that you have a hard disk with the file ANSI.SYS in your DOS directory. If your system is not organized like this, make sure to copy the file ANSI.SYS to your startup diskette, and modify the drive and path name in the device command accordingly.
2) **Using the PROMPT Command.** The general format of the DOS command we will be using is PROMPT $e[#;...;#m where # represents the numbers that control color choices (see table below). The ":...;" means that we can use as many different numbers as we want, as long as we separate them with semicolons. Let's try a few examples to make things clearer. If you type the

Screen Color Choices

0 All attributes off	32 Green foreground	41 Red background
1 Bold on (high intensity)	33 Yellow foreground	42 Green background
5 Blink on	34 Blue foreground	43 Yellow background
7 Reverse video on	35 Magenta foreground	44 Blue background
8 Cancel on (invisible)	36 Cyan foreground	45 Magentabackground
30 Black foreground	37 White foreground	46 Cyan background
31 Red foreground	40 Black background	47 White background

command PROMPT $e[44m you will set the background to blue. Notice that we only had one number. For a Christmas effect, try PROMPT $e[42;31m producing red letters on a green background. And for the truly distracting, PROMPT $e[33;1;45;5m gives you blinking high-intensity yellow letters on a magenta background. Unfortunately, these usual PROMPT commands destroy the normal DOS prompt. So type PROMPT pg to set your DOS prompt to the path and a greater then sign. Or you can combine it all into one command PROMPT $e[33;1;44m$p$g to produce yellow letters on a blue background and a normal DOS prompt. If you find a combination that you wish to use every day, just add the PROMPT command to your AUTOEXEC.BAT file.

University of North Texas WordPerfect Users Group

By Sandy Franklin, Academic Computing Services Microcomputer Support

We have had two meetings of the UNT WordPerfect Users Group. They were held in Marquis Hall, Room 105 during the 3rd Friday lunch hour. We have had representatives from several offices on campus and have had time to share questions and answers to office problems using WordPerfect.

Because of Spring Break, the next meeting will he Friday, **March 23, from noon to 1 p.m. In Marquis Hall, Room 105.** This meeting will include a handout concerning the transition from WordPerfect Version 5.0 to 5.1, and a handout on the Notebook program in WP Library/Office.

These meetings are open to anyone who wants to learn more about WordPerfect in an informal setting. We welcome your attendance and your input at these meetings. Please put March 23 on your calendar and join us for lunch in Marquis 105. §

Assign Commands to Your DOS Function Keys

Do you find yourself typing the same DOS commands over and over again? If you do, then save time by assigning these frequently used commands to your function keys. Not only will you reduce keystrokes, you will also avoid typing errors. One press of a function key and your command is executed. Any IBM PC-compatible computer that has the ANSI.SYS driver loaded can redefine function keys to execute DOS commands.

Command Format

Use this form of the DOS Prompt command to redefine the function keys

PROMPT $e[0;#"*command string*";13ppg

1) The DOS function keys have special numbers assigned to them; F1 is assigned 59, F2 is assigned 60, and so on up to F10 being assigned to 68. Replace the # in the command format with a number between 59 and 68 inclusive to choose the key you are redefining.
2) Replace the words *command string* with a DOS command, such as DIR or COPY *.* A:
3) Including the number 13 in the above command string is the equivalent of pressing the <ENTER> key. This means that the function key can simulate typing the command at the DOS prompt but will not execute it until you press <ENTER>.
4) The pg at the end of the prompt command sets the actual DOS prompt back to the current path and a greater than sign.

Examples

If you enter the command **PROMPT $e[0;59;'DIR";13p$p$g**

then pressing F1 displays the current directory. The following command

PROMPT $e[0;66;"COPY *.WP A:"p$p$g

has no 13 in it. So pressing F8 puts the command COPY *.WP A: at the DOS prompt and waits for you to confirm the command by pressing Enter. You can put the number 13 in between two command strings to activate multiple DOS commands with a single keystroke. After you enter the command

PROMPT $e[0;67;"CD \WP50";13;"WP";13ppg

pressing the F9 key changes your current directory to \WP50 and runs the program WP.EXE

Notes

- The effect of these commands disappears whenever you restart your computer. If you want to make the function key assignments permanent, put the PROMPT commands in your AUTOEXEC.BAT file.
- No need to worry about your WordPerfect or Lotus 123 function keys being corrupted by DOS function key redefinitions; these function key assignments are active only under DOS.
- If you are using the DOS 4.0 shell, avoid redefining the function keys F1, F2, F3, and F10. The shell uses these keys for its own purposes.

*Reprinted, with minor changes, from articles by Wilson Gibbins (BITNET:ACS_WILSON@JMUAX1) that appeared in the December 1989 and January 1990 issues of *the Computer Connection*, the newsletter of the Office of Information Technology, James Madison University.§

VAX COMPUTER CLUSTER

VAX/VMS Computing in the 1990s

By Billy Barron, VAX System Manager (BITNET: BILLY@UNTVAX)

As the 1990s began, DEC introduced a mainframe class VAX known as the VAX 9000. With the VAX 9000, DEC now has a VMS software compatible product line which spans from workstations all the way to mainframe class machines. At the same time, DEC has also become a major player in the Unix RISC arena, which makes many people wonder about the future of VAX/VMS.

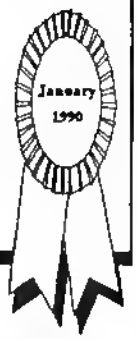
Many of DEC's VMS users are considering a move to Unix. The primary motivation being that Unix machines give a better price/performance ratio than VAXes. Therefore, the future of VAX/VMS will depend on DEC's pricing to a large extent.

From a technological standpoint, VAXes are going to grow in several ways. Of course, the first is the development of smaller, faster processors. Also, DEC is on the verge of introducing vector processor add-on boards for the VAX. These vector processor add-on boards are not useful in processing typical interactive jobs, but can speed up large batch type processing enormously. The last and most interesting hardware changes are in the area of parallel processing. Already the VAX 6000 supports up to 6 processors. As the 90s progress, I expect we will see VAXes with more and more processors. Especially in transaction processing and time sharing environments, parallel processing makes a lot of sense.

On the software side of things, several exciting changes will happen. First, DEC is providing a version of X-Windows for free with VMS now. (For more details on X-Windows, see the X-Windows articles on pages 4 through 6 in this issue of *Benchmarks*) Most likely over time many VMS users will switch from the DCL command interpreter to X-Windows. With the VAX 9000 introducation, many software vendors are porting their IBM mainframe applications to the VAX. However, at the same time, many VAX software vendors are porting their VAX applications to Unix. A consistent rumor for the past year is that DEC has ported the VMS operating system to a RISC platform. DEC violently denies this, but if it is true, it would do much to reduce the cost difference between Unix and VMS.

In the first half of the 1990s, VAX/VMS will remain an important platform at UNT as well as industry. As I am writing this article, I expect to have a new VAX 6310 system delivered before it is published [see page 4 to find out what happened — ed.]. In addition, there is some discussion of replacing the processor with a much faster processor in FY91. The fate of VMS at UNT during the second half will depend on how well the VAX 9000 mainframe succeeds against IBM in industry and the effect of Unix in industry.§

BEST OF THE BBS



Edited by Mark Thacker, VAXProgrammer/Operator (BITNET: MARK@UNTVAX)

*Welcome to the **Best of the BBS** column. This column highlights some of the more interesting and useful discussions on the UNT BBS. For those of you not familiar with the BBS, here is how to log into the UNT BBS.*

- *Sign-on by typing CALL DEC at the LAN prompt and then entering BBS as your Username at the VAX prompt.*
- *If you are already logged-on to the VAXcluster, type BBS at the $ prompt.*

*The opinions expressed in this column do not necessarily reflect the views of Academic Computing Services or the Computing Center. Also, information in **Best of the BBS** has not been checked for accuracy.*

Upgrading your PC-XT

#33558 8-JAN-1990 19:28:14.28

Subject : 80286 upgrade

I want to upgrage an 8088 to 80286. Can someone tell me how much this might cost, and how difficult or easy it is to do?

.....

#33564 Reply to #33558 8-JAN-1990 20:39:24.66

Subject : RE: 80286 upgrade

The upgrade depends on what kind of upgrade you want to do, and how much you want to spend.

If you want FULL 80286 power, then your best bet is to find someone who would want to buy your XT and use that money to help buy an AT class machine.

If you want just the speed of the chip, then it is possible to buy upgrade boards, add-in cards, and the like for your XT... This is not really good practice because you still have your 8 bit slots .. it doesn't do any good to have a 16 bit processor when it can't take advantage of a faster bus speed.

Also, don't forget that a normal AT motherboard will *NOT* fit in an IBM PC/XT style case. So, if you want to just upgrade the motherboard and some of the add-on cards (hard drive controller, video card, etc) then a new case might be in order. Your keyboard (if you bought it recently) should have the ability to work with an AT motherboard. Check for switches on the bottom of the keyboard. Usually there's an XT/AT toggle switch. If your keyboard has such a switch, then you don't need to buy another keyboard.

MS-Karmit 3.0 Ralaasad

#34624 26-JAN-1990 16:53:50.50

Subject : MS-Kermit 3.0

MS-Kermit version 3.0 is now in the IBM.COMM directory in a file called KERMIT3.ARC. MS-Kermit 3.0 adds support for VT320 terminals. Many other new and wonderful features were also added.

The documentation is a little strange. The full documentation for version 2.32A is available and release notes for 3.0 are there (MSVIBM.UPD). You need both to have a complete manual.

Procomm Screen Capturas

#34039 18-JAN-1990 11:03:58.32

Subject : Procomm

Here goes: Is there any better way to capture a communications session than by using the alt-G (dump screen) command? What I would like to do is say, "starting now, save everything that passes the screen onto such and such disc drive:\filename." As it stands, the only thing I am able to do is save one screen at a time using that dump screen command.

.....

#34084 Reply to #34039 19-JAN-1990 08:21:36.72

Subject : RE: Procomm

To start logging to a disk file, push ALT-F1. You will be asked for a file name. From this point until you push ALT-F1 again, everything you type will go to a disk file.

Macintosh Interferon obsolete

#33382 3-JAN-1990 16:41:21.43

Subject : Interferon

Robert J. Woodhead on November 13th, 1989 said that his anti-viral program, Interferon, is now obsolete. He thanked everyone who sent him a shareware donation for Interferon and asked no more donations be sent; he has designated both Interferon and Mandelcolor, another one of his programs, as freeware.

It is suggested that Mac users needing virus protection use Disinfectant and/or Gatekeeper. §

VAXCLUSTER USAGE STATISTICS

January Top Ten Programs: Frequancy of Runs

Program	Description	Number of Runs	Percent of Total
1. LOGINOUT	User login	54340	17.7
2. SET	VMS Utility	46405	15.1
3. DIRECTORY	VMS Utility	26167	8.5
4. User programs	Compiled Programs	22439	7.3
5. SEND	Bitnet Message Utility	15481	5.0
6. DELETE	VMS Utility	15186	4.9
7. TYPE	VMS Utility	12674	4.1
8. SHOW	VMS Utility	12189	4.0
9. SYSLOGIN	User Login	12122	3.9
10. SHOWUSERS	The WHO command	7991	2.6
Total		307201	

January Top Tan Programs: CPU Tima Uaad

Program	Description	CPU Time	Percent of Total
1. User programs	Compiled Programs	40 04:37:41.54	79.3
2. LISP	Lisp Interpreter	2 18:18:16.85	5.4
3. NEWS	ANU News Utility	1 21:29:36.78	3.7
4. BACKUP	Disk Backups	0 16:48:41.19	1.4
5. MAIL	VMS Mail	0 12:50:58.88	1.1
6. BBS	Bulletin Board	0 11:03:44.47	0.9
7. LOGINOUT	User login	0 09:58:35.32	0.8
8. EDT	Editor	0 06:36:35.87	0.5
9. XYZZY	BITNET Chat Utility	0 06:22:46.41	0.5
10. TPU	TPU Editor	0 05:42:48.12	0.5
Total		50 16:44:43.55	

VAX System News

Read the VAX News for information on the following topics:

- **VAX Lisp Repaired**
- **Pascal 4.0 Available for Testing**

ADMINISTRATIVE COMPUTING

Registrar's Office Employs State of the Art Technology, Improves Efficiency and Security

By Claudia Lynch, *Benchmarks* Editor (BITNET: AS04@UNTVM1)

The NT Registrar's office installed a computer assisited retrieval (CAR) system in the fall of 1986. The system was purchased from Eastman Kodak (Rochester, NY) and is trademarked as the KAR information system. In an interview with a representative from Eastman Kodak, Joneel Harris, UNT Registrar, pointed out that the University of North Texas is the fastest-growing university in the state of Texas. With enrollment up 43 percent since 1980, UNT has boosted its student base by five to ten percent a year. This spells success for the university and headaches for many staff members, including student records and iranscript personnel. "Coping with 43 percent growth in the student body is extremely difficult," Harris noted. "It has forced us io re-examine the way we do things and institute innovative methods that allow us to deal with rapidly growing numbers of students without adding a proportionate number of personnel" — thus KAR.

KAR uses 16mm roll microfilm records and has greatly improved the security of student records, as well as freed the staff from time-consuming manual preparation and refiling procedures. According to Harris, "We maintained student records on a microfiche jacket system from the 1960's to 1986. We bad no disaster recovery system. Creating and maintaining the cards was time-consuming and labor-intensive. We realized reduced need for space was our only savings with that system, so we began looking for a different system — a system that would automate retrieval of documents and prevent misfiled and lost documents."

KAR has lived up to the hopes Harris and colleagues had for an efficient, secure system. Both student records, which include permanent academic records, admission applications, grade changes, university correspondence, withdrawls, degree plans, graduation applications, etc., and transfer transcripts are kept on the KAR system. "This system greatly improves the security of student records since we are able to siore ihe microfilm original off-site," stated Harris. "Records preparation is much faster since operators do not have to organize the documenis in social security order and ihen afterwords cut and insert filmed documents like they did with the previous microfiche jacket system."

According to Paula Jones, Assistant Registrar, transcripts from other universities comprise the largest retrieval application of ihe KAR system here at UNT. The university processes about 80,000 iranscripts per year, and about 45,000 of those records ihis year will be iransfer transcripts prinied from the KAR microfilm records.

Academic history files, more than 275,000, all on paper, have recently been transferred to 16mm roll microfilm so that they can be accessed by the KAR system. Those records represent student files from 1890 to 1984. From 1984 on, academic records have been kept on-line.

Documents continue to be microfilmed and indexed daily. One operator microfilms almost 10,000 documents a month on the Kodak Starfile RV-3 planetary camera. The operator also simultaneously indexes each document by keying ihe siudeni's social security number and a four letter document code after each document is microfilmed. Additional data are extracted from the Administrative mainframe and downloaded, via tape, to the KAR system.

While KAR is impressive as it stands, Harris stated that "One of the reasons we selected Kodak as our CAR vendor is their commitment to a migration path for future technologies. I see records management becoming more decentralized. We want to equip other departments with the ability to view records. Now faculty and staff come to us and we have to print a copy every time they need to see a record. In the future, departments all over this university should be able to view records and make prints as required."

The KAR system as implemenied ai UNT has been wriiten aboui in several naiional publicaiions. A recenl article, "CAR Saves Time, Adds Security," appeared in *Modern Office Technology* (November 1989).§

Grooms Recognized as Outstanding Employee

Mashid Grooms was honored by the University on February 21 for ber outstanding contributions in support of the Financial Aid Management (FAMS) component of SIMS.§

COMPUTING TECHNICAL SERVICES

Mainframe Performance Statistics

Operating Systems Performance Statistics for January

CPU	SYSTEM	Planned Production Hours	Production Hours Achieved	System Uptime
ACAD	VM/SP5	732.00	708.97	96.9%
ACAD	MUSIC/SP	695.12	664.86	95.6%
ACAD	MVS/JES2	731.56	696.70	95.2%
ACAD	COMPLETA	725.77	688.77	94.9%
ADMN	MVS/JES2	744.00	741.88	99.7%
ADMN	COMPLETA	314.00	310.10	98.8%
ADMN	ADABASA	724.53	682.20	94.2%

- The ACAD CPU achieved 100% uptime in January.
- The HDS/7360 DASD achieved 100% uptime in January.
- The HDS/7380 DASD achieved 100% uptime in Januery.
- The ADMN CPU achieved 100% uptime in Jenuary.
- The HDS/7360 DASD achieved 100% uptime in January.
- The HDS/7380 DASD achieved 100% uptime in January.
- The EMC Solid Stete Disk achieved 98.1% uptime in January.$

Key Cauaes Of Lost Productivity In Jenuary: ACAD CPU

CPU, Tape, and Disk Subsystems (HDS)

1. Extended problem resolution with software configuretion during MP converaion of 8083.		5.41 HOURS.
2. Conversion of HDS 8083 to e Dual Processor.		5.00
	TOTAL	10.41 HOURS

Miscellaneous

1. Syetems software development.	1.41 HOURS
2. Emergency ehutdown due to feilure of chilled weter circuletion pump for GAB 560.	8.77
3. VM software regen for MP converelon of 8083.	7.61
4. VM software peging error on 7380 DASD.	5.25
5. Restored 8083 proceseor to MP configuretion efter HDS FE felled to copy microcode changee to IMPL beckup diek.	4.06
6. DASD file maintenence on MUSIC/SP.	2.65
7. Emergency ehutdown due to fielure of TRANE chilled weter condenser units.	2.05
8. Undetermined cauaee for eyeteme restarts.	1.04
TOTAL	41.85 HOURS
GRAND TOTAL	52.26 HOURS

Key Causes Of Lost Productivity In January: ADMN CPU

Disk Subsystems (EMC)

1. Intermittent read/write failures due to incorrect version of microcode installed.	1.24 HOURS

Miscellaneous

1. DASD file meintenence on ADABAS.	37.89 HOURS
2. Undetermined cauees for systeme restarts.	3.79
3. MPU entered epin-loop efter stopping eyetem with STOP Key on Operator Console.	1.25
TOTAL	42.93 HOURS
GRAND TOTAL	44.17 HOURS

Disk Backup Schedules

SYSTEM	BACKUP	DESCRIPTION
Administrative MVS/SP	Daily	Monday - Friday around 7 p.m. (after COM-PLETE is shut down) & on Saturday & Sunday if COM-PLETE has been up that day.
	Weekly	Full pack dumps taken each Suncay morning.
	Monthly	Full pack dumps taken on the first day of each month.
Academic MVS/SP	Daily	Monday - Sunday during the early hours of the morning.
	Weekly	Full pack dumps taken each Sunday.
	Monthly	Full volume dumps taken on the first day of each month.
MUSIC/SP	Daily	Wednesday - Monday starting at 4 a.m. and lasting about 30 minutes.
	Weekly	Tuesday mornings at 3 a.m., these last about 2 hours.
	Semester	Onee a semester, a permanent backup is taken.
VM/SP	VM Weekly	Early every Wednesday morning.
	CMS mini-disks	Daily backup performed early every morning. Weekly backup every Wednesday starting at 3 a.m..
VAXcluster	Daily	Incremental backups are peprformed Monday - Thursday at 6 p.m.
	Weekly	Full backups are performed every Friday beginning at 8 a.m. and generally last all day.
	Monthly	A "stand alone" backup is performed monthly. Dates and times are given in the system log-on message.
	Semester	Once a semester, a permanent backup is taken.

A full description of the system backup procedures can be found by typing HELP BACKUP on MUSIC/SP or theVAXcluster.

ACADemic (HDS) Program Hit Parade

January Top Ten Programs : Frequency Of Runs

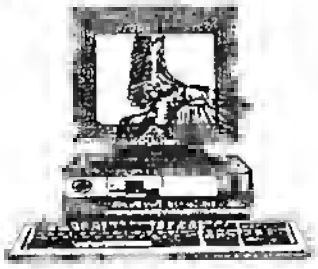
	Program	Description	#of Runs	% of Total
1.	IDCAMS	VSAM Utility	7516	18.6
2.	IEWL	Linkage Editor	4774	11.8
3.	PGM=*.DD	Compiled Program	4719	11.7
4.	IEBGENER	IBM Utility	3778	9.4
5.	SASLPA	SAS	3506	8.7
6.	IKFCBL00	VS COBOL Compiler	2598	6.4
7.	IKJEFT01	Password Change	2214	5.5
8.	SPSSX	SPSS-X	1634	4.1
9.	CASMA001	Sort Utility	1327	3.3
10.	FORTVS	VS FORTRAN	1024	2.5

January Top Tan Programs: CPU Seconds Used

	Program	Description	CPU Seconds	% of Total
1.	SASLPA	SAS	177785	62.8
2.	PGM=*.DD	Compiled Program	37448	13.2
3.	COMPLET4	Academic COM-PLETE	22375	7.9
4.	SPSSX	SPSS-X	13437	4.7
5.	ADARUN	ADABAS Utility Module	3794	1.3
6.	IDCAMS	VSAM Utility	2730	1.0
7.	ICKDSF	DASD Init. & Verification	2517	0.9
8.	IKFCBL00	VS COBOL Compiler	2291	0.8
9.	SSS4001	Operations Automation	2065	0.8
10.	ISTINM01	VTAM Utility	1631	0.6

The programs listed in this section were used the most frequently on the HDS ACADemic CPU during the month of January, 1990.

Please Note that ACAD is the official designation of the HDS/8083 CPU that is dedicated to faculty and student use. The HDS/8083 CPU reserved for University administrative purposes is termed ADMN.§



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I wish to attend:

- **Introduction to SAS (ISB 123):**
  ___ Monday, March 26: 6-8 p.m.
- **Introduction to CMS (ISB 123)**
  ___ Tuesday, March 27: 3-5 p.m.
- **Adv. Data Management (ISB 123)**
  ___ Monday, April 2: 3-5 p.m.
- **Introduction to SPSS-X (ISB 123):**
  ___ Thursday, March 29: 3-5 p.m.
- **Introduction to WP 5.1 (ISB 110)**
  ___ Friday, March 30: 1-4 p.m.
- **Advanced WP 5.1 (ISB110)**
  ___ Friday, April 2: 1-4 p.m.

I would like to see more classes offered: ____ on weekends; ____at night.

The classes I am interested in are: _____

_____

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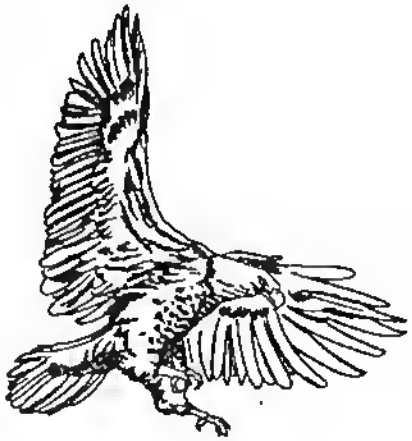

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